

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS**

In re application of:)	
)	Examiner: Turocy, David P.
Mukai et al.)	
)	Art Unit: 1762
Application No: 09/910,583)	
)	Confirmation No.: 1386
Filed: July 20, 2001)	
)	
For: METHOD AND APPARATUS FOR)	
CONTROLLING DOPANT CONCENTRATION)	
DURING BPSG FILM DEPOSITION TO REDUCE))	
<u>NITRIDE CONSUMPTION</u>)	

Assistant Commissioner For Patents
Board of Patent Appeals and Interferences
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF
TO EXAMINER'S ANSWER

Pursuant to 37 C.F.R. § 41.41, and in response to the Examiner's Answer dated March 17, 2008, Appellant submits the attached Reply Brief.

I hereby certify that this correspondence is being deposited via
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May 16, 2008
Date of Deposit

/Justin K. Brask/
Justin K. Brask, Reg. #61,080

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I. STATUS OF CLAIMS

Claims 14-19 and 23 are pending in the present application.

Claims 1-13, 20-22 and 24-32 have been canceled.

Claims 18, 19 and 23 have been allowed.

Claims 14-17 have been finally rejected under 35 U.S.C. 103(a) in an Office Action mailed August 2, 2007.

Claims 14-17 are the subject of this reply brief.

II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 14-17 are unpatentable under 35 U.S.C. 103(a) over Yang (KR 2001055915), hereinafter “KR 915,” in view of Xia et al. (EP 0843348), hereinafter “EP 348,” and further in view of Germann et al. (EP 1139403), hereinafter “EP 403.”

III. ARGUMENT

Claim Rejections – 35 U.S.C. § 103(a)

Claims 14-17

In the Examiner’s Answer, the Examiner maintained the rejection of appealed claims 14-17. Specifically, the Examiner’s Answer states,

“[t]he following ground(s) of rejection are applicable to the appealed claims: Claims 14-17 rejected under 35 U.S.C. 103(a) as being unpatentable over KR 2001055915 (KR 915) in view of EP 843348 (EP 348) and further in view of EP 1139403 (EP 403).” (*See* Examiner’s Answer, p. 3, first paragraph.)

However, Appellant herein asserts that the proposed modification of KR 915 by EP 403 changes the principle of operation of KR 915. Accordingly, the rejection of claims 14-17 should be removed and the claims allowed.

Claims 14-17 are directed to a method of forming an insulating film on a substrate to reduce nitride consumption during manufacture. First, a silicon source gas, an oxygen source gas, and a boron source gas are injected into a chamber to form a borosilicate glass layer over a nitride layer on the substrate. Then, a phosphorous source gas is injected into the chamber while

injection of the silicon source gas, the oxygen source gas, and the boron source gas is continued in order to deposit a borophosphosilicate glass layer over the borosilicate glass layer. (See Appellant's Appeal Brief, p. 4, third paragraph.) Furthermore, claims 14-17 include the element **"stabilizing individually"** the flows of the source gases **"prior to mixing any of the flows."** (See Appellant's Appeal Brief, p. 7, second paragraph.) That is, the flows of all of the silicon source gas, the oxygen source gas, the boron source gas, and the phosphorous source gas are stabilized before the formation of both the borosilicate glass layer and the borophosphosilicate glass layer. This order of stabilizing prior to any mixing of the flows allows for very controlled formation of the borosilicate glass layer and the borophosphosilicate glass layer.

In rejecting claims 14-17, the Examiner relies on KR 915 to disclose, "depositing a film of BPSG on [a] BSG layer," and relies on EP 403 to disclose, "allowing the source gases to bypass the chamber until their flows stabilize when depositing doped silicon oxide films such as BPSG." (See Examiner's Answer, pp. 3 – 4.) However, in order to deposit a BSG film followed by a BPSG film to form a BSG/BPSG layer in a single deposition process step, KR 915 discloses using a "time difference in which the source gas of the phosphorous and boron is stabilized in the interlayer dielectric layer deposition." (See KR 915, English translation of Abstract.) That is, in KR 915, the boron source gas and the phosphorous source gas are stabilized at different times in order to first deposit a BSG film and then to deposit a BPSG film in the same deposition process step. By contrast, EP 403 discloses a method

"to deposit a doped silicon oxide layer [that] stabilizes the gas mixture ratio while not introducing the gas mixture into the reactor. Therefore, **no reaction takes place in the reactor before the gas mixture ratio has stabilized.**" Accordingly, "the silicon oxide layer is **deposited more homogeneously because the gas mixture is already stabilized.** (See EP 403, paragraph [0009]; emphasis added.)

That is, in EP 403, the source gases are stabilized as a mixture in order to form a homogeneous doped silicon oxide layer.

Citing *In Re Ratti*, the M.P.E.P. states,

"[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." (See M.P.E.P. 2143.01 § VI.)

The proposed modification of KR 915 by EP 403 changes the principle of operation of KR 915. Specifically, in KR 915, boron and phosphorous source gases are stabilized at different times in order to first deposit a BSG film and then to deposit a BPSG film. In doing so, the phosphorous source gas is not mixed with the boron source gas to form the BPSG film until after the boron source gas has already begun flowing into the reaction chamber to first form the BSG film. This approach leads to the formation of a non-homogeneous BSG/BPSG layer in a single deposition process step. By contrast, in EP 403, “no reaction takes place . . . before the gas mixture ratio has stabilized.” In doing so, a homogeneous doped silicon oxide layer is produced. However, if the source gases of KR 915 are stabilized as a mixture in the manner of EP 403, a BSG film cannot be deposited prior to the formation of a BPSG film in order to form a non-homogeneous BSG/BPSG layer because the phosphorous source gas is introduced into the reaction chamber at the same time as the boron source gas. Instead, a homogeneous BPSG layer, as opposed to a non-homogeneous BSG/BPSG layer, would be “deposited more homogeneously because the gas mixture is already stabilized.”

Accordingly, the proposed modification of KR 915 by EP 403 changes the principle of operation of KR 915 and, so, the rejection of claims 14-17 should be removed and the claims allowed.

IV. CONCLUSION

For the reasons stated above, claims 14-17 are patentable under 35 U.S.C. 103(a) over KR 915 in view of EP 348, and further in view of EP 403.

Appellant respectfully requests that the Board reverse the rejections of claims 14-17 under U.S.C. § 103(a) and direct the Examiner to enter a Notice of Allowance for claims 14-17.

Appellant believes that no fee is required for consideration of this reply brief, as the fee of \$510.00 to cover the appeal fee for one other than a small entity as specified in 37 C.F.R. §1.17(c) was submitted with the originally filed appeal brief. Please charge any shortages and credit any overcharges to our Deposit Account No. 02-2666.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN, LLP

Date: May 16, 2008

/Justin K. Brask/
Justin K. Brask
Reg. No. 61,080

1279 Oakmead Parkway
Sunnyvale, CA 94085-4040
(503) 439-8778